On the founding of nests by Ants; and a few notes on Myrmecophiles.

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The early idea of how a colony of ants was started was that a solitary female ant, after her marriage flight, found a suitable spot, and laying her eggs, brought up the brood herself. This, of course, holds good with many species (*Lasius flavus* and *L. niger*, *Myrmica rubra*, etc.), but of late years much progress has been made in our knowledge of how some other species found their colonies, and the reason of our finding mixed nests of ants. Much patient research has been given to the subject by Wheeler, Wasmann, and others. I propose to deal briefly with a few of these points, having recently carried on some successful experiments which appear to help to confirm the new views.

It is quite clear that in the *Formica rufa* group (*F. rufa*, *F. pratensis*, *F. sanguinea*, *F. exsecta*) the queens have lost the power of founding colonies by themselves. They either do so by branch nests, by being accepted into a nest of their own species near at hand, or received back into their own, or by entering a nest of another species of ant belonging to the *F. fusca* group. In the latter event, the *F. rufa* ♀ enters a new, or weak, *F. fusca* nest, and, after more or less fighting with the *F. fusca* ☿s, is accepted by them, and her first brood is brought up with their help. It is exceedingly probable that she kills the *F. fusca* ♀, if present, as there is now evidence on this point. I determined to try and see if I could get a *F. rufa* ♀ accepted in one of my observation nests, and have been entirely successful, as the following notes will show.

I had some 40 ☿s of *F. rufibarbis* var. *fusco-rufibarbis*, which Mr. Keys had sent me, last July, from Whitsand Bay, in a combined Fielde and Janet nest. These, on January 28th, I confined in the one compartment of the nest by blocking up the connection between the two with cotton wool. Into the empty compartment I put a ♀ *F. rufa* from a *rufa* nest I had in a glass bowl, and which I had brought from Nethy Bridge last May. I kept the ♀ by herself till February 1st, to allow her to somewhat get rid of her own nest aura, as she would do in nature. A ♀, after her marriage flight, would be wandering about for some days. She would also remain in the neighbourhood of the *F. fusca* nest she had found, and would work her way in by degrees. On February 1st, I removed the obstruction between the two compartments. Several ☿s entered her compartment, the ♀ seemed very restless, repeatedly entering their compartment and returning again; at first when she met ☿s they ran away, and she also seemed to hurry out of their way. On February 2nd she was attacked, but regained her own compartment, in which five ☿s had entered. I blocked up the connection for the night leaving her with these five. February 3rd she was again attacked, and she killed a very persistent ☿ after trying hard to conciliate it by much antenna-tapping and stroking. Later, another pulled her along by the antenna, the ♀ only tapped it with her other antenna, and finally it let go. Meanwhile, another ☿ climbed over and under the ♀ without attacking her. Later, the ♀ was fed by a ☿! At night the ♀ was sitting with two ☿s in a corner, quite friendly, and tapping antennæ together. I allowed more ☿s to enter. On February 4th I introduced another ☿,

the ♀ tapped it hard with her antennæ and stroked it briskly on both sides of the head with her front feet. February 6th the ♀ was attacked by a ☿, which eventually she killed. February 7th, as half the ☿s remained in the other partition of the nest, I put the ♀ and the ☿s with her into a small plaster nest with only one compartment, and gradually introduced the remaining ☿s. One of these persisted in attacking her, and, after fighting with it all day, both rolling over and over, she killed it in the evening. By February 9th I had introduced all the ☿s into this very small nest; they are now all quite friendly, and the ♀ sits on and among them in a corner. They clean her legs and body and feed her. To-day, February 24th, having given them some honey, at which nearly all the ☿s fed, the ♀ was afterwards fed by some of them. It is, therefore, quite clear that if this ♀ will lay eggs the larvæ will be brought up by these strange ☿s. It also confirms the fact that ☿s of the *F. fusca* group will accept a strange *F. rufa* ♀.

In the event of a *F. sanguinea* queen entering a strange *F. fusca* nest, she takes possession of the pupæ, fights with, drives away, or kills, the *F. fusca* ☿s, and, when the *F. fusca* pupæ hatch, they help her to bring up her brood. The mixed character of the nest is kept up by slave raids on other *F. fusca* nests. I carried out some experiments last year with *F. sanguinea* ☿s, and these I recorded in detail in a paper on "Experiments with Ants' nests," which I read before the Entomological Society of London on December 1st, 1909.

In the two experiments which were successful (*i.e.*, in which the *F. sanguinea* ♀ was not killed), the ♀s killed all the *F. fusca* ☿s in the nests into which I introduced them, and took possession of the *F. fusca* cocoons, and sat on them in a corner of the nest. These two experiments also confirmed what had been recorded about *F. sanguinea*.

Formica exsecta appears to generally found its colonies, according to Wasmann, with *F. fusca*. The ♀ *F. exsecta* is smaller in comparison with her ☿s than is the case with the rest of the *F. rufa* group, and is of a darker colour, and would thus be more easily accepted by the *F. fusca* ☿s. Wheeler has also shown this to be the case with the *F. exsecta* race in America. Forel, however, has recorded that it also forms colonies by branch nests, where the species is numerous and many nests are found together. This was probably the case at Bournemouth, where I found many *F. exsecta* nests all together, but in the Isle of Wight, and at Aviemore in the Highlands, where I discovered this rare species, the former method was probably that used. At Parkhurst Forest the few nests were in the ground, and with very little nest materials built on them, suggestive of a recent *fusca* origin. At Aviemore, two nests close together were of the usual *exsecta* type, built up of grass and ling, but the third, which was a mile or two away, was partly under a large stone, a heap of the nest material being built up on one side. Under the stone were galleries such as are constructed by *F. fusca*.

Lasius umbratus is said sometimes to found its colony in a nest of *L. niger*. Mr. Crawley records that he had a ♀ *L. umbratus* accepted by a *L. niger* nest (*Ent. Mo. Mag.*, 1909, p. 94), which agrees with this view.

Lasius fuliginosus, which is often very numerous in a district in which it occurs, partly founds its colonies by branch nests. Wasmann has pointed out, however, that nests of *Lasius umbratus* are frequently

found at the foot of trees inhabited by *L. fuliginosus*, and he goes on to demonstrate that the ♀ *L. fuliginosus* has founded her colony in the *L. umbratus* nest. Crawley has recently recorded that he found ☿s of *L. umbratus* in company with *L. fuliginosus*.

In the *Ent. Record*, 1897, p. 246, I recorded that I found a large nest of *L. fuliginosus* in the hollow of a tree at Lymington, and that *Lasius flavus* was living with it, both species coming in and going out together. I am now convinced that the species was really *L. umbratus*, I was not so well acquainted with our ants at that time, and I remember distinctly thinking how large the *L. flavus* ☿s were. Dr. Joy has shown me a large nest of *L. umbratus* at Wellington College, in the heart of a district thickly populated with *L. fuliginosus* nests.

The following observations should have appeared in my Myrmecophilous notes for 1909 :—

Pseudoscorpionina.—*Chernes scorpioides*, Herm.—In May last this species was found in the greatest profusion in *F. rufa* nests at Buddon Wood, Leicestershire. Mr. Wallace Kew, who kindly identified them for me, told me there were ♂s, ♀s, and ♀s carrying eggs externally, present. They occurred in the nests, literally in thousands, especially at the very bottom of the nest. Every handful of the *débris* of the nests placed on paper was seen to be swarming with the Chelifers. The ants paid no attention to them. It has been recorded with the same ant in Denmark by Hansen. I have taken it sparingly with *F. rufa* at Weybridge (*Ent. Rec.*, 1907, p. 255), and have introduced specimens into my observation-nests. The ants treated them with indifference. When a *F. rufa* ☿ was forced to take hold of a Chelifer, it dropped it at once. I think it is quite clear that this species, at least, cannot be said to have "nothing to do with ants." *Ideoroncus cambridgii*, L. Koch.—Several specimens were found in nests of *L. flavus* at Virtuous Lady Mine, in Devonshire, in April. *Chthonius rayi*, L. Koch, occurred in a nest of *F. rufa* in Parkhurst Forest, Isle of Wight, in April. I have taken this common species before with *L. fuliginosus* at Oxshott.

Proctotrypidæ.—*Paragryon myrmecophilus*, n. s.—My friend, Mr. F. Bouskell, and I found this little apterous species in a nest of *Lasius flavus* in Bradgate Park, Leicestershire, on May 3rd last. *Teleas myrmecobius*, n. s. ♂ and *Hoplogryon myrmecobius*, n. s. ♀.—I took these two specimens in a nest of *Lasius fuliginosus* at Darenth Wood on September 24th. Dr. Kieffer, who proposes these names for the three above new insects, tells me that he gives the same specific name to the last two because he believes that the genera *Hoplogryon* and *Teleas* are not distinct, and that these are possibly, therefore, ♂ and ♀ of the same species.

Acarina.—*Uroplitella minutissima*, Berl., occurred in nests of *Lasius niger* at Box Hill in May. *Urotrachytes formicarius*, Lubb., with *L. flavus* at Sandown, Isle of Wight, in April. *Trachyuropoda coccinea* var. *sinuata*, Berl., with *L. niger* at Cothill, near Oxford, in June. Mr. N. D. F. Pearce tells me he considers this to be the same species as *T. excavata*, Wasm. *Laelaps laeris*, Mich. ?—I took this specimen with *F. exsecta* at Aviemore in May. Mr. Pearce writes that it is very large, 1200μ, and the hairs seem too pronounced for *L. laeris*. It is probably new. *Laelaps oophilus*, Wasm.—I took a ♀ *Formica rufibarbis* var. *fusco-rufibarbis* at Sandown, Isle of Wight, on April 24th last, with a number of this little mite on her body. As this little species lives amongst the

egg-masses of the ants, they would leave the ♀ after the eggs were laid. Later in the year, when all the eggs would have hatched, Mr. Keys sent me specimens from Devonshire, taken loose in the nest of *F. rufa*.

Mr. Pearce considers two mites I took in nests of *Tetramorium caespitum* at Whitsand Bay, in April, 1907, to be *Laelaps myrmophilus*, Mich. It has not been recorded from Britain before.

A phylogenetic sketch of the Pyrameid group of Vanessids

(*with plate*).

By T. REUSS.

(*Concluded from* p. 67).

Turning now to the *atalanta*-form group of species two of which have been mentioned already in connection with the *cardui*-form species, one finds that all these forms, while exhibiting great disparity in size, may be characterised facially as follows: *Upperside* ground colour black or brown-black, often showing a bronze gloss, with bands of red or reddish-orange, crimson, orange or yellowish; and with the apex of forewings blotched with white. As will be seen, this description could be applied also to *P. atalanta* and its aberrations alone. The *undersides* are generally like those of *atalanta* and *indica* (fig. 17), but often show less detail, and are more plain in their colouring, as is, however, often the case also in aberrations of *P. atalanta*. Sometimes the blue marking beyond the red band of the forewing is ring-shaped, as in the large *P. itea*, F., of Australia, with creamy-yellow bands, and *P. gonerilla*, F., of New Zealand; also a large species, with red or crimson bands; another time the blue appears as a narrow brilliant streak crossed by the veins of the wings, so in *P. tammeamea*, Esch., a giant form from the Sandwich Islands, with fiery orange bands shaped as in *P. indica*, while otherwise the blue marking is intermediate in different ways between the ring and the streak, as in *P. atalanta*, *P. indica*, and in *P. dejeani*, Godt., from the mountains of Java, the latter very much resembling *P. atalanta* in size and character of markings, but in the ground colour *P. dejeani* is lighter bronze, and the bands are dull yellow in colour. In *all* the species mentioned, including the Araschnids, the curious markings that look like the number 980 in the hindwing of *P. atalanta*, (pl. i., fig. 18) are more or less plainly indicated.

According to the shape and position of the red or yellow colour-bands, the six species divide into three pairs: (1) *atalanta*, *dejeani*, (2) *indica*, *tammeamea*, (3) *itea*, *gonerilla*. The two latter species from Australia—New Zealand differ from the others in the colour-bands of the upperside of the hindwings, which are placed and ocellated much as in the well-known British *Erebia aethiops* or *E. epiphron*. The white-centred and white-ringed ocelli show up where in *atalanta* and *indica* only a row of dark patches follows the inner margin of the red band (fig. 13), but, in *Pyrameis atalanta* ab. *merrifieldi*, these patches are blue-centred and blue-ringed. On the forewings of *itea* and *gonerilla* the bright bands are much shorter and broader than in *atalanta*, and form large blotches of colour. The ground colour in the yellow-marked *itea* is bronze-brown; in the crimson-banded *gonerilla* it is black. Except for the blue ring on the forewing, the underside facies in both species is some-